

## PATENT ABSTRACTS OF JAPAN

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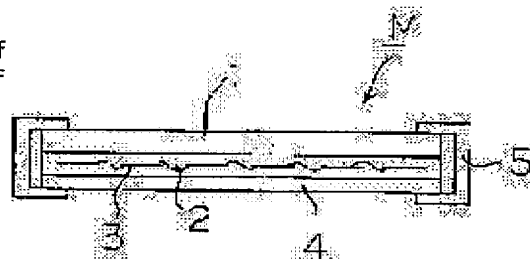
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## (54) SOLAR CELL MODULE

## (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a solar cell module, by which a color can be matched with the translucent colored sections of a window and eaves and even making it into daylight is enabled from the opening of a solar cell element, when parts of the window and eaves of a translucent colored building are replaced with the solar cell modules.

**SOLUTION:** A transparent resin-sealed material 2, into which the solar cell elements 3 are sealed, and a rear cover 4 having translucency are disposed sequentially on the backside of a surface cover 1 having light transmission properties, at least a plurality of translucent films are laminated on the rear cover 4, and a film preventing permeation of steam is contained. Additionally, the backside cover further contains a colored film.



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CLAIMS

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## [Claim(s)]

[Claim 1] It is the solar cell module characterized by including the film which is the solar cell module which carries out sequential arrangement of the rear-face covering which has the transparence resin enclosure material which enclosed the solar battery element, and translucency, and grows into the rear-face side of surface covering which has translucency, and the laminating of the film which has two or more translucency at least is carried out, and said rear-face covering changes, and prevents transparency of a steam.

[Claim 2] Said rear-face covering is a solar cell module according to claim 1 characterized by including the colored film.

[Claim 3] Said rear-face covering is a solar cell module according to claim 1 characterized by including the film which absorbs ultraviolet rays.

[Claim 4] The solar cell module according to claim 1 characterized by the field of the outside of said rear-face covering being a split face-like.

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## DETAILED DESCRIPTION

## [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the solar cell module of the lighting mold which can be installed suitable for an aperture, a canopy top, etc. of a building.

[0002]

[Description of the Prior Art] Conventionally, the plurality of a solar battery element is connected to a serial or a serial parallel, and it changes, and in the solar cell module on which translucency members, such as glass, were made to stick these through a binder (transparence resin enclosure material), in order to give the moisture-proof engine performance, metallic foils, such as aluminum, are used by the rear-face covering. However, since the whole rear face (non-receiving light field side) of a solar cell module was covered with the metallic foil, lightning was not able to be improved through the clearance between solar battery elements.

[0003] Moreover, although rear-face covering can be colored the color and equivalent color of an aperture or a roof when transposing the aperture of the building which translucency colored, and a part of canopy top to a solar cell module, since it is opaque, there is no sense of togetherness on some designs of the colored aperture which has translucency, or a canopy top, and appearance spoils a fine sight bad very much.

[0004] moreover, when the film which have a penetrable moisture proof engine performance be use for rear face covering, since the thickness of a moisture proof processing film be thin ( 100 ~ 500 \*\* extent ), a processing film be destroy from the blemish from the outside etc., a steam etc. infiltrate into the interior of a solar cell module, and there be a possibility that discoloration or the wiring material of a solar battery may corrode [ transparence resin enclosure material ].

[0005] Moreover, when a film is degraded when the film of light transmission nature is used for rear-face covering, and ultraviolet rays infiltrate into the interior of rear-face covering, or the film is being colored, there is a possibility of making it fading and yellowing.

[0006] Moreover, it may be manufactured by elevated-temperature pressurization adhesion, the profile of a solar-battery configuration looms in a solar cell module rear face by this, and the conventional solar cell module is not desirable on an appearance design.

[0007] Then, this invention is thought out in view of many above-mentioned conventional problems, and in case it transposes the aperture of a building and the part of a canopy top which translucency was colored to a solar cell module, it can double the translucency coloring part and color of an aperture or a canopy top, and it aims at offering the solar cell module which also makes lighting possible from the clearance between solar battery elements.

[0008]

[Means for Solving the Problem] It is characterized by including the film which the solar cell module of this invention carries out sequential arrangement of the rear-face covering which has the transparence resin enclosure material which enclosed the solar battery element, and translucency, and grows into the rear-face side of surface covering which has translucency, the laminating of the film which has two or more translucency at least is carried out, and rear-face covering changes in order to attain the above-mentioned purpose, and prevents transparency of a steam. Furthermore, it is characterized by rear-face covering containing the colored film. Furthermore, it is characterized by rear-face covering containing the film which absorbs ultraviolet rays. Furthermore, it is characterized by the field of the outside of rear-face covering being a split face-like.

[0009] By the above configuration, if rear-face covering will contain the film which can color the translucency which gave the moisture-proof engine performance and a solar cell module is seen from a rear face, lighting not only becomes possible from the coloring part of the translucency of solar-battery clearance, but it can use it as the solar cell module excellent in the fine sight in which the profile of a solar battery element is not conspicuous, either.

[0010]

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained based on a drawing.

[0011] It is characterized by to be included the film which the laminating of the film which has the translucency of at least plurality [ covering / 4 / rear-face ] is carried out by solar cell module M of this invention carrying out sequential arrangement of the rear-face covering 4 which has the enclosure material 2 of the transparence resin which enclosed the solar battery element 3, and translucency, and growing into the rear-face side of the surface covering 1 which has translucency, and changes as shown in drawing 1, and prevents transparency of a steam.

[0012] That is, on the surface covering 1 which are translucency members, such as shock resistance, glass by which heat strengthening was carried out, and plastics, two or more solar battery elements 3 are connected to a serial or a serial parallel, and elevated-temperature pressurization adhesion of the rear-face covering 4 of transparence resin which puts into the enclosure material 2 which consists of EVA (ethylene vinyl acetate), and has the translucency which carries out a postscript is carried out for these in one, and the metal frames 5, such as aluminum, are attached in a perimeter, and, specifically, it changes.

[0013] Next, the rear-face covering 4 is explained to a detail based on drawing 2 and drawing 3.

[0014] For example, as shown in drawing 2, it considers as the structure between which the thickness of the whole which gave the moisture-proof engine performance put the central film 7 which consists of the weatherproof good fluororesin film or weatherproof PET (polyethylene terephthalate) film which is 25-75 micrometers through adhesives 12 with the inside film 6 of translucency, and the outside film 8 of translucency, respectively from the both sides. And the inside film 6 side is made into the light-receiving side side of

solar cell module M.

[0015] The central film 7 makes the thin films 9, such as a metal oxide film (for example, an alumina and a silica) with which the steam transparency prevention engine performance has the field of the outside film 8, the bright film whose whole thickness formed in about 100-500Å in thickness with vacuum deposition is about 10-30 micrometers. The reason for making the central film 7 into this range is that thin film processing will become difficult if too thin, and it will become what it is hard to handle on a modular process if too thick.

[0016] Let the outside film 8 be the weatherproof good fluororesin film or weatherproof PET film which formed the coloring member 10 which colored the central film 7 side the color of arbitrary translucency on the design and whose whole thickness is 25-75 micrometers. Here, the coloring member 11 is performed by printing the coating of for example, an urethane system in thickness of 1-2 micrometers on a film front face. The reason for making thickness of the outside film 8 into the above-mentioned range is that it will become what it is hard to handle on a modular process if too thick [ if too thin, a role of a protection film cannot be played, and ].

[0017] Let the inside film 6 be the film of the translucency of the same quality of the material as an outside film, and thickness. Furthermore the quality of the material and thickness of the inside film 6 and the outside film 8 are made the same, and in case it treats as a sheet, the fault of curling on a roll can be prevented.

[0018] Moreover, by making the inside film 6 or the enclosure material 2 an ultraviolet absorption type (for example, thing which mixed the ultraviolet ray absorbent in the raw material, made it the shape of a film or coated the film front face with the ultraviolet ray absorbent), it can prevent that ultraviolet rays penetrate to the central film 7 and the outside film 8 as much as possible, and fading, yellowing, etc. of the outside film 8 of a coloring part can be prevented as much as possible.

[0019] Moreover, on a manufacture process, since elevated-temperature pressurization adhesion is carried out, the front face of the outside film 8 usually tends to become concave convex as a solar-battery configuration. Here, elevated-temperature pressurization adhesion says performing temperature of 140-150 degrees C, and vacuum pressurization 1333Pa or more by the vacuum laminating method.

[0020] Then, as shown in drawing 3 , it becomes possible for the irregularity of the front face formed at the time of production to stop being conspicuous, and to raise appearance design nature by considering as the detailed split face 11 (it being 40-60nm of Ra at arithmetic mean granularity at the time of film membrane formation) at the lateral surface of the outside film 8. In addition, as shown in drawing 3 , solar cell module M of this invention hopes that there is no coloring member 10, and if it can be colored, it is good.

[0021]

[Effect of the Invention] As mentioned above, as explained in full detail, according to the solar cell module of this invention, in fields other than a solar battery element, coloring which has translucency can be carried out and it becomes possible by changing the color of rear-face covering to double design nature with a surrounding building.

[0022] Moreover, as rear-face covering of a solar cell module, while having the moisture-proof engine performance, it becomes possible to improve lightning through the clearance between solar battery elements.

[0023] Furthermore, when using a solar cell module as a canopy top, lightning can be improved moderately, shading and the solar cell module which whose design nature by the side of a solar cell module rear face also improved, and was excellent in the fine sight can be offered.

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## DESCRIPTION OF DRAWINGS

## [Brief Description of the Drawings]

[Drawing 1] It is the sectional view which explains typically the operation gestalt of the solar cell module concerning this invention.

[Drawing 2] It is the expanded sectional view which explains typically rear-face covering which constitutes the solar cell module concerning this invention.

[Drawing 3] It is the expanded sectional view which explains typically other rear-face coverings which constitute the solar cell module concerning this invention.

## [Description of Notations]

- 1: Surface covering
- 2: Enclosure material (transparence resin enclosure material)
- 3: Solar battery element
- 4: Rear-face covering
- 5: Frame
- 6: Inside film
- 7: Central film
- 8: Outside film
- 9: Thin film
- 10: Coloring member
- 11: Surface roughening
- 12: Binder

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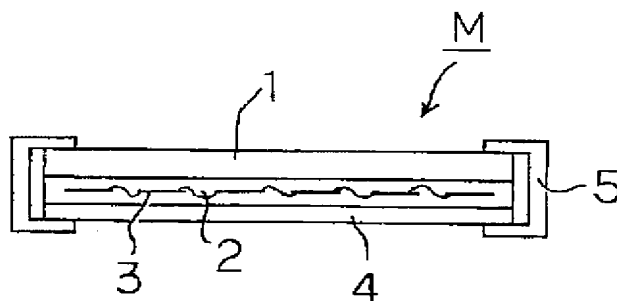
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(54)【発明の名称】 太陽電池モジュール

(57)【要約】

【課題】 透光性の着色された建物の窓やひさしの一部を太陽電池モジュールに置き換える際に、窓やひさしの透光性着色部分と色を合わせることができ、太陽電池素子の隙間から採光をも可能にする太陽電池モジュールを提供すること。

【解決手段】 透光性を有する表面カバー1の裏面側に、太陽電池素子3を封入した透明樹脂封入材2、及び透光性を有する裏面カバー4を順次配設して成り、裏面カバー4は少なくとも複数の透光性を有するフィルムが積層されて成り、且つ水蒸気の透過を防止するフィルムを含むことを特徴とする。さらに、裏面カバーは着色したフィルムを含むことを特徴とする。



**【特許請求の範囲】**

**【請求項 1】** 透光性を有する表面カバーの裏面側に、太陽電池素子を封入した透明樹脂封入材、及び透光性を有する裏面カバーを順次配設して成る太陽電池モジュールであって、前記裏面カバーは少なくとも複数の透光性を有するフィルムが積層されて成り、且つ水蒸気の透過を防止するフィルムを含むことを特徴とする太陽電池モジュール。

**【請求項 2】** 前記裏面カバーは着色したフィルムを含むことを特徴とする請求項 1 に記載の太陽電池モジュール。

**【請求項 3】** 前記裏面カバーは紫外線を吸収するフィルムを含むことを特徴とする請求項 1 に記載の太陽電池モジュール。

**【請求項 4】** 前記裏面カバーの外側の面が粗面状であることを特徴とする請求項 1 に記載の太陽電池モジュール。

**【発明の詳細な説明】****【0001】**

**【発明の属する技術分野】** 本発明は、建物の窓やひさしなどに好適に設置可能な採光型の太陽電池モジュールに関する。

**【0002】**

**【従来技術とその課題】** 従来より、太陽電池素子の複数の直列又は直並列に接続して成り、これらをガラス等の透光性部材に接着材（透明樹脂封入材）を介して貼着させた太陽電池モジュールにおいて、防湿性能を付与するために、その裏面カバーにアルミニウムなどの金属箔を使用されてきた。ところが、太陽電池モジュールの裏面（非受光面側）全体が金属箔に覆われるので、太陽電池素子の隙間を通して採光することはできなかった。

**【0003】** また、透光性の着色した建物の窓やひさしの一部を太陽電池モジュールに置き換える場合、裏面カバーは窓や屋根の色と同等色に着色することはできるが、不透明のため透光性を有する着色した窓やひさしの一部との意匠上の一体感がなく、非常に見栄えが悪く美観を損ねるものとなる。

**【0004】** また、裏面カバーに透過性の防湿性能を有するフィルムを使用した場合、防湿処理膜の厚さが薄い（100 ～ 500 Å 程度）、外部からの傷等で処理膜が破壊され、太陽電池モジュール内部に水蒸気等が浸入し、透明樹脂封入材が変色または太陽電池の配線材が腐食してしまうおそれがある。

**【0005】** また、裏面カバーに光透過性のフィルムを使用した場合、紫外線が裏面カバー内部に浸入することにより、フィルムを劣化させたり、フィルムを着色している場合は退色、黄変させてしまうおそれがある。

**【0006】** また、従来の太陽電池モジュールは高温加圧接着により製作されることがあり、これにより太陽電池モジュール裏面に太陽電池形状の輪郭が浮き出しま

い、外観意匠上好ましくない。

**【0007】** そこで本発明は、上述の従来の諸問題に鑑み案出されたものであり、透光性の着色された建物の窓やひさしの一部を太陽電池モジュールに置き換える際に、窓やひさしの透光性着色部分と色を合わせることができ、太陽電池素子の隙間から採光をも可能にする太陽電池モジュールを提供することを目的とする。

**【0008】**

**【課題を解決するための手段】** 上記目的を達成するために、本発明の太陽電池モジュールは、透光性を有する表面カバーの裏面側に、太陽電池素子を封入した透明樹脂封入材、及び透光性を有する裏面カバーを順次配設して成り、裏面カバーは少なくとも複数の透光性を有するフィルムが積層されて成り、且つ水蒸気の透過を防止するフィルムを含むことを特徴とする。さらに、裏面カバーは着色したフィルムを含むことを特徴とする。さらに、裏面カバーは紫外線を吸収するフィルムを含むことを特徴とする。さらに、裏面カバーの外側の面が粗面状であることを特徴とする。

**【0009】** 以上の構成により、裏面カバーは防湿性能を付与した透光性の着色可能なフィルムを含むことになり、太陽電池モジュールを裏面から見ると太陽電池すきまの透光性の着色部分から採光が可能となるだけでなく、太陽電池素子の輪郭が目立たない美観に優れた太陽電池モジュールにすることができる。

**【0010】**

**【発明の実施の形態】** 以下、本発明の実施形態を図面に基づいて説明する。

**【0011】** 図 1 に示すように、本発明の太陽電池モジュール M は、透光性を有する表面カバー 1 の裏面側に、太陽電池素子 3 を封入した透明樹脂の封入材 2、及び透光性を有する裏面カバー 4 を順次配設して成るものである。裏面カバー 4 は少なくとも複数の透光性を有するフィルムが積層されて成り、且つ水蒸気の透過を防止するフィルムを含むことを特徴とするものである。

**【0012】** すなわち具体的には、耐衝撃性や熱強化されたガラスやプラスチック等の透光性部材である表面カバー 1 上に、複数の太陽電池素子 3 を直列又は直並列に接続し、これらを透明樹脂の例えば EVA（エチレンビニルアセテート）から成る封入材 2 に入れ、後記する透光性を有する裏面カバー 4 を一体的に高温加圧接着し、周囲にアルミニウム等の金属製の枠 5 を取り付け成るものである。

**【0013】** 次に、裏面カバー 4 について、図 2 及び図 3 に基づいて詳細に説明する。

**【0014】** 例えば、図 2 に示すように、防湿性能を付与した全体の厚さが 25 ～ 75 μm の耐候性の良好なフッ素樹脂フィルムまたは PET（ポリエチレンテレフタレート）フィルムから成る中央フィルム 7 を、その両側から透光性の内側フィルム 6 と透光性の外側フィルム 8

とで、それぞれ接着剤 12 を介して挟み込んだ構造とする。そして、内側フィルム 6 側を太陽電池モジュール M の受光面側とする。

【0015】中央フィルム 7 は、外側フィルム 8 の面を水蒸気透過防止性能の有する金属酸化膜（例えば、アルミナやシリカ）などの薄膜 9 を厚さ 100～500 Å 程度に蒸着法で形成した、全体の厚さが約 10～30 μm の透明フィルムとする。中央フィルム 7 をこの範囲とする理由は、薄すぎると薄膜処理が困難となり、厚すぎるとモジュールの製法上、ハンドリングし難いものとなっ

てしまうからである。

【0016】外側フィルム 8 は、中央フィルム 7 側を意匠上任意な透光性の色に着色した着色部材 10 を設けた、全体の厚さが 25～75 μm の耐候性の良好なフッ素樹脂フィルムまたは PET フィルムとする。ここで、着色部材 11 は例えばウレタン系の塗料をフィルム表面に 1～2 μm の厚さに印刷することにより行う。外側フィルム 8 の厚さを上記の範囲にする理由は、薄すぎると保護フィルムとしての役割を果たすことができず、また厚すぎるとモジュールの製法上ハンドリングし難いもの

となってしまうからである。

【0017】内側フィルム 6 は、外側フィルムと同じ材質、厚さの透光性のフィルムとする。さらに内側フィルム 6 と外側フィルム 8 の材質と厚さを同じとし、シートとして扱う際にロール上にカールするという不具合を防止することができる。

【0018】また、内側フィルム 6 又は封入材 2 を紫外線吸収タイプ（例えば、紫外線吸収剤を原料に混入しフィルム状にしたり、フィルム表面に紫外線吸収剤をコーティングしたもの）にすることで、中央フィルム 7 及び

外側フィルム 8 へ紫外線が透過することを極力防止し、外側フィルム 8 の着色部分の退色や黄変などを極力防止することができる。

【0019】また、外側フィルム 8 の表面は製作工程上、通常、高温加圧接着されることから太陽電池形状の通り凹凸状になりやすい。ここで、高温加圧接着は、真空ラミネート法により、140～150℃の温度、1333 Pa 以上の真空加圧を行うことをいう。

【0020】そこで、図 3 に示すように、外側フィルム\*

\* 8 の外側面に微細な粗面 11（フィルム成膜時に算術平均粗さで Ra 40～60 nm）とすることで、作製時に形成される表面の凹凸が目立たなくなり、外観意匠性を向上させることが可能となる。なお、図 3 に示すように、本発明の太陽電池モジュール M は、着色部材 10 がなくともよく、着色可能であればよい。

#### 【0021】

【発明の効果】以上、詳述したように、本発明の太陽電池モジュールによれば、太陽電池素子以外の領域において、透光性を有する着色をすることができ、裏面カバーの色を変えることにより、まわりの建物との意匠性を合わせることが可能となる。

【0022】また、太陽電池モジュールの裏面カバーとして、防湿性能を備えるとともに、太陽電池素子のすきまを通して採光することが可能となる。

【0023】さらに、太陽電池モジュールをひさしとして使用する場合、遮光しながら適度に採光することができ、太陽電池モジュール裏面側の意匠性も向上し美観に優れた太陽電池モジュールを提供できる。

#### 【図面の簡単な説明】

【図 1】本発明に係る太陽電池モジュールの実施形態を模式的に説明する断面図である。

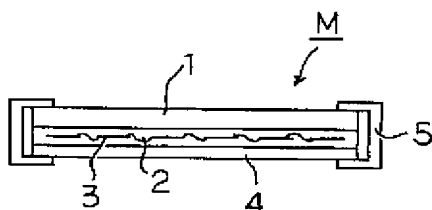
【図 2】本発明に係る太陽電池モジュールを構成する裏面カバーを模式的に説明する拡大断面図である。

【図 3】本発明に係る太陽電池モジュールを構成する他の裏面カバーを模式的に説明する拡大断面図である。

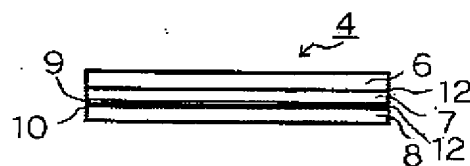
#### 【符号の説明】

- 1：表面カバー
- 2：封入材（透明樹脂封入材）
- 3：太陽電池素子
- 4：裏面カバー
- 5：枠
- 6：内側フィルム
- 7：中央フィルム
- 8：外側フィルム
- 9：薄膜
- 10：着色部材
- 11：粗面処理
- 12：接着材

【図 1】



【図 2】





【図 3】

